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February 1, 2006

Via Electronic Delivery

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Marlene H. Dortch
Federal Communications
Commission
445 12th Street, S.W.
Washington, DC 20554

Re: EX PARTE SUBMISSION
WT Docket 03-66; Amendment of Parts 1, 21, 73, 74, and 101 of the
Commission's Rules to Facilitate the Provision of Fixed and Mobile
Broadband Access, Educational and Other Advanced Services in the 2150-
2162 and 2500-2690 GHz Bands

Dear Ms. Dortch:

On February 1, 2006, Bruce Jacobs, counsel to NY3G Partnership ("NY3G"), met with Aaron Goldberger, Legal Advisor to Commissioner Tate, to discuss NY3G's position in the above-referenced proceeding. Mr. Jacobs shared several documents with Mr. Goldberger, including the attached maps depicting the New York City market and the attached proposal to modify Section 27.1206 of the Commission's rules, both of which had been submitted previously for the record. In addition, Mr. Jacobs subsequently e-mailed Mr. Goldberger a copy of the attached white paper prepared by Dr. Thomas Hazlett, which had also been submitted previously for the record.

Very truly yours,

/s/

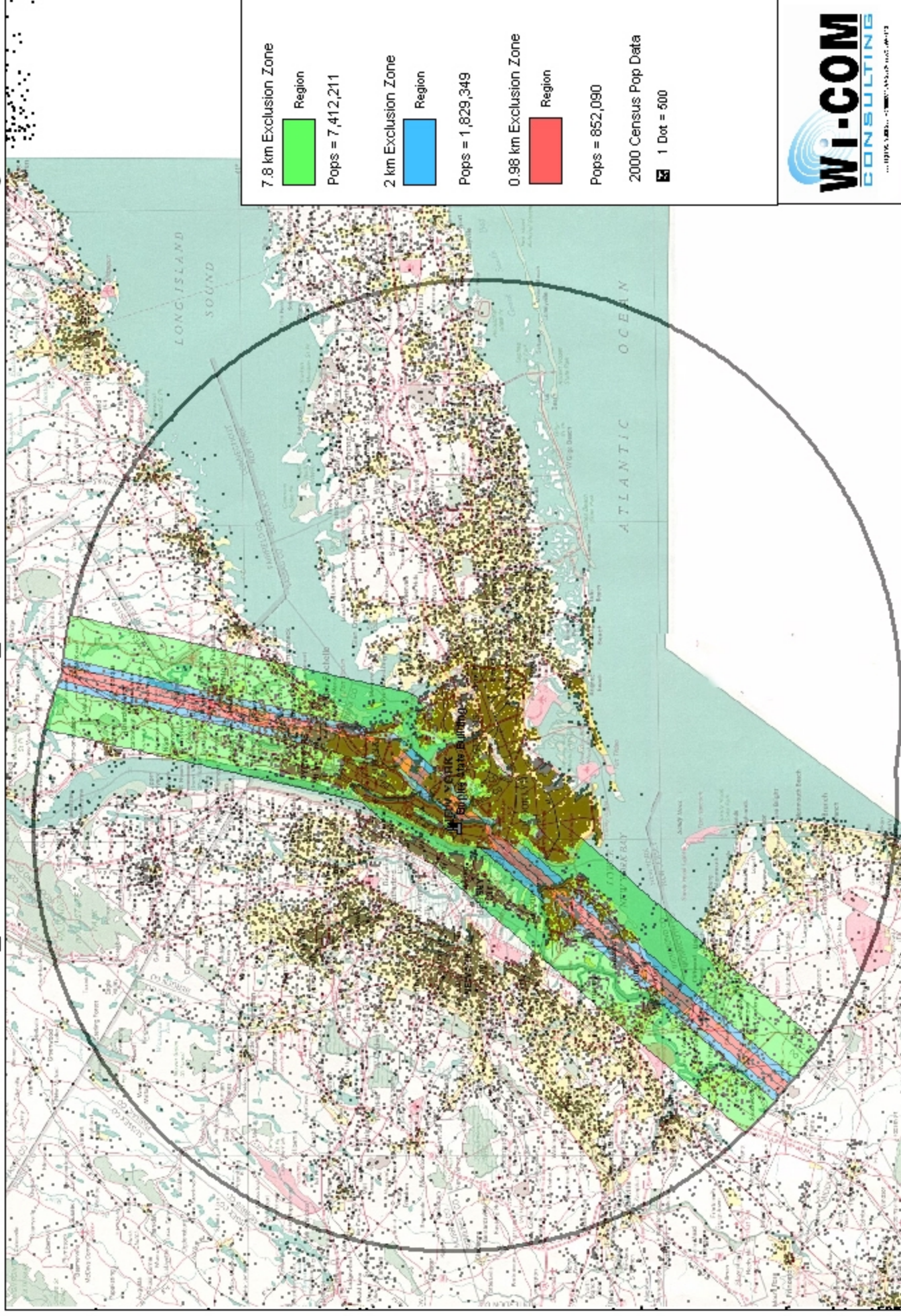
Bruce D. Jacobs
Counsel for NY3G Partnership

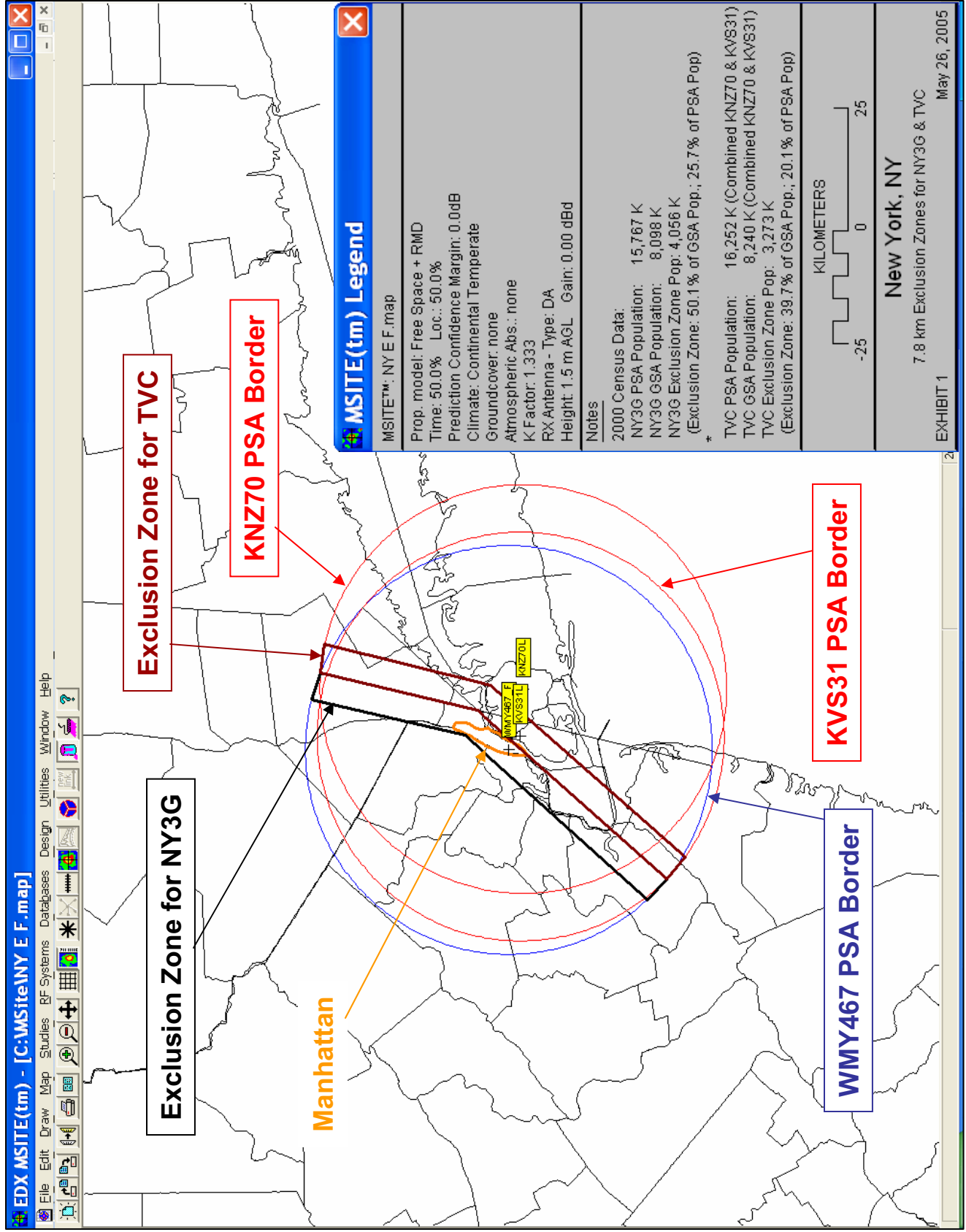
Attachments

cc: Aaron Goldberger

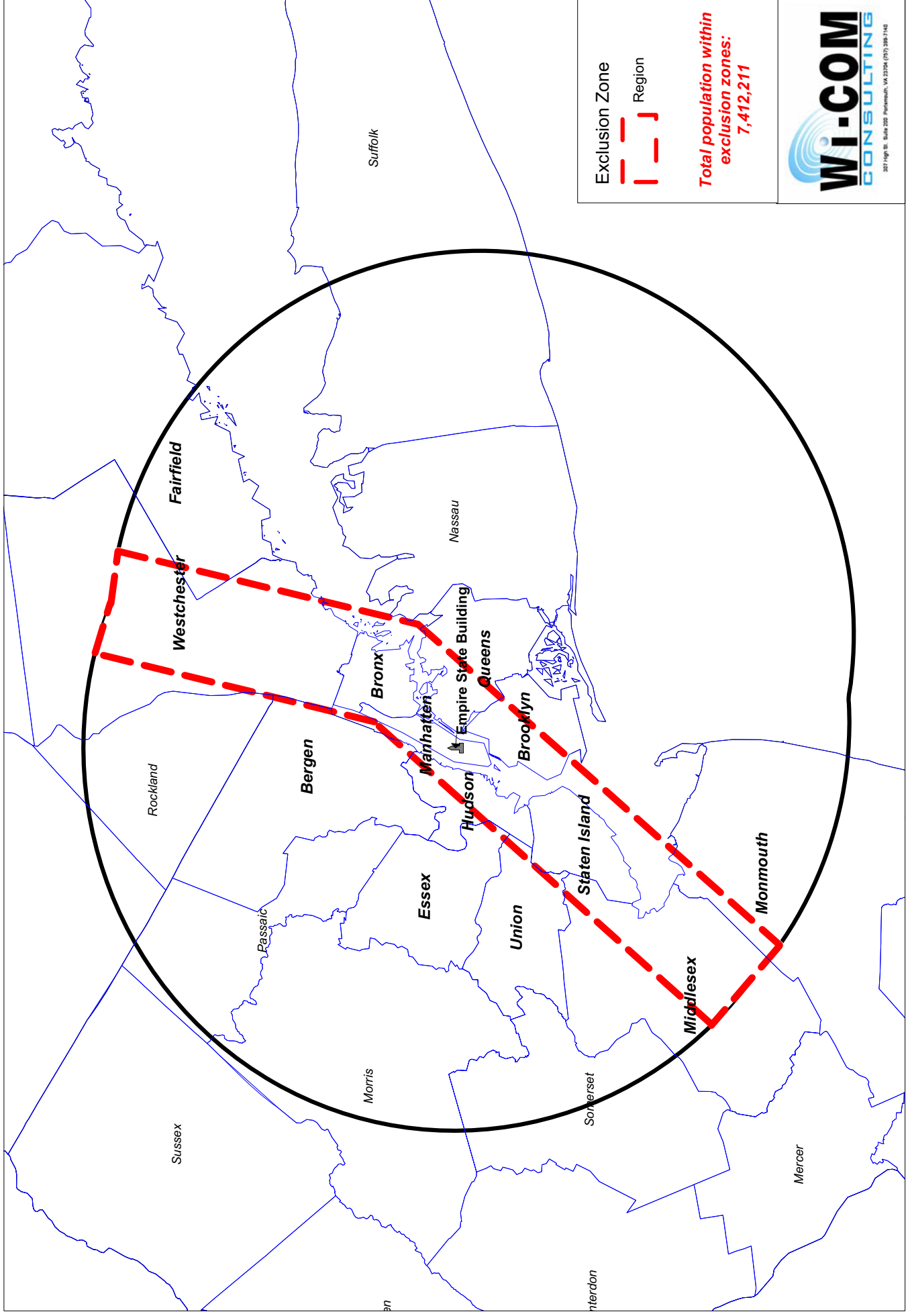
EXHIBIT A

F Group GSA Map - New York City





F Group GSA Map - New York City



F Group GSA Map - New York City

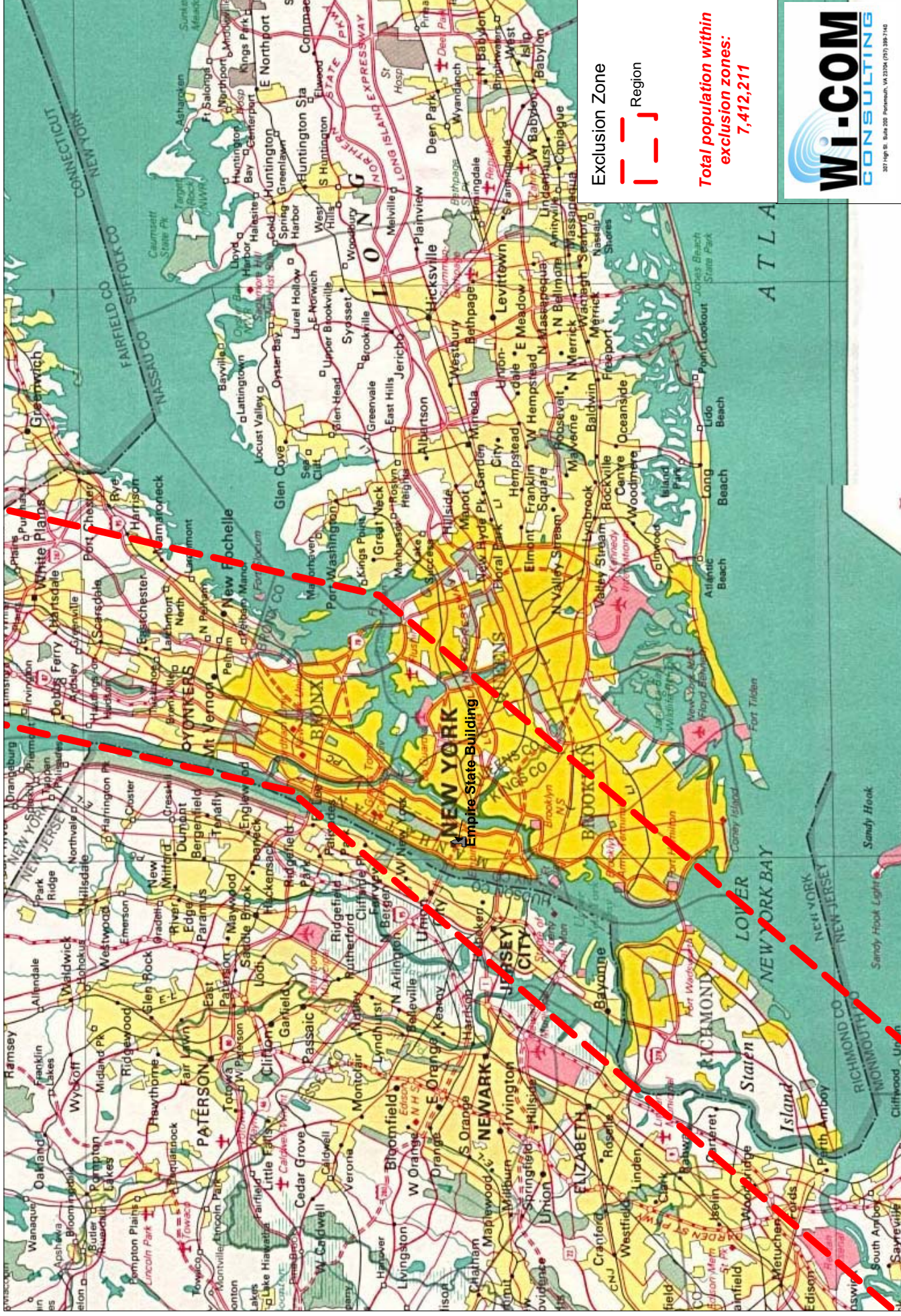


EXHIBIT B

§27.1206 Geographic Service Area.

(a) The Geographic Service Area (GSA) is either:

(1) The area for incumbent site-based licensees that is bounded by a circle having a 35 mile radius and centered at the station's reference coordinates, which was the previous PSA entitled to incumbent licensees prior to January 10, 2005, and is bounded by the chord(s) drawn between intersection points of the licensee's previous 35 mile PSA and those of respective adjacent market, co-channel licensees, except if the overlap of the PSAs of incumbent site-based co-channel BRS and grandfathered EBS licensees operating on the E or F group channels would result in an exclusion zone containing [3] million or more people and more than [33]% of the total population of the combined GSAs of the co-channel licensees. (An exclusion zone is the area within 7.8 kilometers of the chord(s) drawn as described above in connection with any two co-channel licensees and within the PSAs of those two co-channel licensees.) In that case, any one of the two affected co-channel licensees may elect during the transition process (see §27.1232 (b),(c)) to divide the channel assignments so that the grandfathered EBS licensee is assigned the one high-powered channel and the BRS licensee is assigned the three low-powered channels. If such an election is made, the GSA for the affected licensees' assigned channel(s) will be the area bounded by that licensee's previous 35 mile PSA centered at the station's reference coordinates and by the chord(s) drawn between intersection points of the licensee's previous 35 mile PSA and those of any other adjacent market co-channel licensees that are operating on the same channels; or:

(2) The BTA that is licensed to the respective BRS BTA authorization holder subject to the exclusion of overlapping, co-channel incumbent GSAs as described in paragraph (a)(1) of this section.

(b) If the license for an incumbent BRS station cancels or is forfeited, the GSA area of the incumbent station shall dissolve and the right to operate in that area automatically reverts to the GSA licensee that held the corresponding BTA.

EXHIBIT C

WHITE PAPER
SUBMITTED TO THE FEDERAL COMMUNICATIONS COMMISSION
BY NY3G PARTNERSHIP

EFFICIENT RIGHTS ASSIGNMENTS IN THE 2.5 GHz BAND

Thomas W. Hazlett
Manhattan Institute for Policy Research
The Wharton School, University of Pennsylvania

January 10, 2005

Due to the historical pattern of regulation and license distribution in the 2.5 GHz band, consumers have been unable to enjoy the potential value of innovative wireless technologies. Transaction costs, hold-up problems, and regulatory uncertainty continue to block efficient utilization of spectrum. New rules allowing service providers to quickly consummate efficient transactions would generate large social gains. This paper shows that, for 2.5 GHz bandwidth in New York City, alternative license rules could create annual consumer benefits of \$35 million to \$194 million in the residential broadband market, while leaving current spectrum users unaffected. Such policy changes would also enhance the development of high-speed networks, a key Commission priority.

Section I. Introduction

The Federal Communications Commission is currently considering policy options in the 2.5 GHz band. One proposal has been submitted to the Commission by NY3G, an MDS licensee in New York City attempting to provide wireless broadband service in the nation's largest market. The firm has asked me to provide a general economic analysis to be submitted to the FCC as a White Paper. This analysis shows that transaction costs, hold-up problems, and regulatory uncertainty continue to block efficient utilization of the 2.5 GHz band in the New York City market. By delineating rights to encourage productive use of spectrum, regulators can significantly reduce transition costs. Very large social gains are estimated to result from such policy reforms.

I am currently a Senior Fellow at the Manhattan Institute for Policy Research, and an Adjunct Professor at the Wharton School at the University of Pennsylvania, where I teach a course in Telecoms and Internet Strategy & Policy. I have previously been a Professor at the University of California, Davis (1984-2000), and served as Chief Economist of the Federal Communications Commission (1991-92). I am also a columnist for the FINANCIAL TIMES (www.ft.com/techforum), and write extensively in scholarly journals as well as popular periodicals on the economics of communications markets.¹ My web page lists many of my publications: <http://www.manhattan-institute.org/html/hazlett.htm>.

This paper attempts to inform Commission decision making in the 2.5 GHz band. In Section II, I provide an overview of the policy failure endemic in this band, with resulting under-utilization of valuable radio spectrum. In Section III, I discuss the relevance of the Coase Theorem, showing the importance of rights assignments that minimize transactional barriers to efficient resource allocation. In Section IV, the tragedy of the anti-commons is described generally and with applicability in the extant policy process. In Section V, remedies are considered. In Section VI, I present estimates of the consumer gains which would accompany an efficient rights structure. I offer concluding remarks in Section VII.

¹ In particular, I have authored these research articles dealing with efficiency in spectrum allocation: *The Rationality of U.S. Regulation of the Broadcast Spectrum*, 33 JOURNAL OF LAW & ECONOMICS 133 (Apr. 1990); *Physical Scarcity, Rent Seeking and the First Amendment*, 97 COLUMBIA LAW REVIEW 905 (Nov. 1997); *Assigning Rights to Radio Spectrum Users: Why Did FCC License Auctions Take 67 Years?*, 41 JOURNAL OF LAW & ECONOMICS 529 (Oct. 1998); *The Wireless Craze, the Unlimited Bandwidth Myth, the Spectrum Auctions Faux Pas, and the Punchline to Ronald Coase's 'Big Joke': An Essay on Airwave Allocation Policy*, 14 HARVARD JOURNAL OF LAW & TECHNOLOGY 335 (Spring 2001); *The U.S. Transition to Digital Television: Time to Toss the Negroponte Switch*, AEI-Brookings Joint Center for Regulatory Studies Working Paper No. 01-15 (Nov. 2001); *What Really Matters in Spectrum Allocation Design* (with Roberto Muñoz), AEI-Brookings Joint Center for Regulatory Studies Working Paper No. 04-16 (Aug. 2004); *Spectrum Tragedies*, YALE JOURNAL ON REGULATION (Summer 2005, forthcoming).

Section II. Policy Failure in the 2.5 GHz Band

The vast disparity between *potential* and *existing* economic value quantifies the extent of anti-consumer regulation in the MMDS/ITFS band,² or what may now be called the BRS/EBS band.³ While lost Consumer Surplus completely dominates supply-side effects, the magnitude of inefficiency is illustrated by comparing the market price of personal communications service (PCS) licenses, allocated spectrum from 1.9 GHz to 2.1 GHz, with prices paid for MMDS licenses, allocated spectrum from 2.5 GHz to 2.7 GHz. Despite differences in the technical properties associated with each, the bands are reasonably comparable for use in delivering wireless services.

PCS licenses are valued, according to the FCC, at \$480 million per MHz, nationwide, or approximately \$1.71 per MHz per pop.⁴ In contrast, Nextwave purchased four MMDS licenses covering Las Vegas, Nevada in 2004 for \$2.25 million. Each MMDS license was allocated 6 MHz. This implies a price per MHz per pop equal to \$0.066, or just 4% as much.⁵ Reviewing all 2001 MMDS licenses trades, consulting firm BIA Financial found that mean price equaled just \$0.047 per MHz per pop.⁶ When Nextel purchased a large block of MMDS licenses pursuant to the bankruptcy of WorldCom in 2003 for \$144 million,⁷ it inspired this comment from an industry insider:

² MMDS is an acronym for Multichannel Multipoint Distribution Systems. ITFS stands for Instructional Television Fixed Service. MDS (dropping “Multichannel”) is used “interchangeably” with MMDS. Federal Communications Commission, *In the Matter of Amendment of Parts 1, 21, 73, 74 and 101 of the Commission’s Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands: Report and Order and Further Notice of Proposed Rulemaking*, WT Docket No. 03-66, RM 10586 (Rel. July 29, 2004) [“FCC July 2004 Order”], par 1.

³ The FCC renamed MDS licenses Broadband Radio Services (BRS) licenses, while ITFS licenses became Educational Broadband Services (EBS). FCC July 2004 Order, par. 6.

⁴ U.S. Population (2000 Census) equals 281,421,906, and the FCC valuation of the 10 MHz Nextel license @ 2 GHz equals \$4.8 billion. *FCC Adopts Nextel Plan To Swap Public Safety Bands For Prime 1.9 GHz Spectrum, But With Important Changes*, 7 BLOOSTONLAW TELECOM UPDATE (July 14, 2004), www.bloostonlaw.com. Hence, $\$4,800,000,000/281,421,906/10 = \$1.706 = \$\text{price}/\text{MHz}/\text{pop}$.

⁵ Dan Meyer, *With \$2.6B, NextWave Reorg to Repay Creditors, Launch Broadband*, RCR WIRELESS NEWS (Dec. 13, 2004), 6. The population of Las Vegas/Clark County, Nevada in 2000 Census equaled 1,428,690 (http://www.lvccld.org/ref_info/reference_faq/population.htm). Hence, $\$2,250,000/1,428,690/24 = \0.066 .

⁶ Camilla Jensen, *ITFS in the Era of Mobility*, BIA Financial Network, presentation to the NIA Conference, Tempe, Arizona (Feb. 2002). My calculation assumes 2.66 persons per household, the mean value derived from the 2000 U.S. Census.

⁷ Dan O’Shea, *Big Nextel bid wins Worldcom wireless assets*, TELEPHONYONLINE.COM, (July 1, 2003), http://www.wirelessreview.com/ar/telecom_big_nextel_bid.

“The spectrum Nextel got was 1/200 the cost of mobile spectrum. A lot of that has to do with how messy the process of being able to provide services in the spectrum...”⁸

The “messy” reference is not directed to the properties of radio spectrum, but to the conflicting rights created and distributed by the FCC. To make productive use of the BRS/EBS band, a service provider must hack through a thicket of countervailing interests. In contrast, a PCS license conveys relatively easy access to radio waves. The difference in regulatory performance is sharp. One approach has allowed investments in wireless networks to proceed; the other has stymied the deployment of innovative technologies.

Regulation of the 2.5 GHz band has destroyed billions of dollars in potential social value. The totals suggested in Table 1, inferred from license prices, are only the tip of the iceberg. In fact, license values represent forecasts of future profits – *producers’* surplus. *Consumer* gains in wireless (as a result of lower prices and/or higher quality) are likely to be at least ten times as great.⁹ Because rights to use BRS/EBS spectrum are so “messy,” wireless operators have been unsuccessful in rolling out the kinds of services that have led to bountiful social value in both the cellular/PCS market and the cable modem/DSL market. The former generates about \$90 billion in annual revenues, and consumer surplus – gains by users in excess of what they pay – of at least another \$80 billion.¹¹ In contrast, the BRS band generates relatively little social value.

⁸ Annie Lindstrom, *Carrying the MDS/ITFS Torch*, SHORECLIFF COMMUNICATIONS MAGAZINE (Sept/Oct 2003), quoting John Hambidge, executive of IP Wireless, a technology supplier; http://www.shorecliffcommunications.com/magazine/print_article.asp?vol=40&story=371.

⁹ Greg Rosston has found that the magnitude of consumers’ surplus in cellular telephone service is at least ten times greater than the corresponding level of producers’ surplus, the profits driving license valuations. Greg L. Rosston, *The Long and Winding Road: The FCC Paves the Path with Good Intentions*, SIEPR Discussion Paper 01-08 (Nov. 2001), 23. This conclusion is consistent with other empirical work. See Jerry A. Hausman, *Mobile Telephone*, Chapter in Martin Cave, et al., eds. HANDBOOK OF TELECOMMUNICATIONS ECONOMICS, VOL. I (Amsterdam: Elsevier, 2002), 564; Thomas W. Hazlett & Roberto Muñoz, *What Really Matters in Spectrum Allocation Design*, AEI-Brookings Joint Center for Regulatory Studies, Working Paper 04-16 (Aug. 2004) [“Hazlett-Muñoz 2004”], 7.

¹⁰ The damage estimates are given in present values, meaning that annual losses are smaller.

¹¹ See Hazlett-Muñoz 2004, 7, 44-45.

TABLE 1. PCS AND MMDS LICENSE VALUES			
	<i>Price/MHz (nationwide)</i>	<i>License Value (nationwide)</i>	<i>Dissipation (per MHz basis)</i>
PCS (~120 MHz)	\$480 million ¹²	\$57.6 billion ¹³	n.a.
BRS (~190 MHz)	\$13.2 million ¹⁴	\$2.5 billion ¹⁵	96%

In 1963, the band stretching from 2500 MHz to 2690 MHz was set aside for educational use. Schools and other charitable institutions were to use the frequency space to transmit instructional video to students. Perhaps the greatest contribution to learning has come via an object lesson in “command and control”¹⁶ regulatory techniques. By assigning rights rigidly, locking users into increasingly outmoded wireless technologies and applications, the Federal Communications Commission affected two outcomes. The first was that licensees were given very limited options for using airwaves, blocking efficiencies. The second was that frequency rights were distributed in such a way that it proved exceedingly difficult to aggregate bandwidth for productive employments.

Since 1974 regulators have attempted to patch the original plan for instructional television.¹⁷ These rule changes have enlarged possible uses in the 2.5 GHz band, paving the way for commercial applications and permitting new technologies. But the reforms have largely proven unsuccessful in unleashing the immense potential value of the band, as the Commission concedes.¹⁸ That is largely due to the transaction costs associated with moving the old scattered parcels of rights into alignment with the new economic opportunities. Sprinkling new rights on top of old rights has created a mish-mash in which efficient forms of organization fail to materialize due to the difficulty in arranging economic agreements between rights holders.

Ideally, the recently liberalized airwave usage rights allotted by the Commission would be quickly reassembled and put to productive use. Channels licensed to disparate parties would be traded such that rational configurations emerged. Yet, this process has been stymied as bargaining has proven difficult. Parties are often unsure about the rights they hold, and fear that otherwise beneficial transactions will result in reduced standing in administrative proceedings. In short, the nature and distribution of rights yields strong incentives for parties not to cooperate.

¹² See explanation in text.

¹³ Calculated as (\$480 million/MHz) * (120 MHz).

¹⁴ Calculated as \$0.047 * 281 million.

¹⁵ Calculated as (\$13.2 million/MHz) * (190 MHz).

¹⁶ The term is used in self-description. See: FCC, *Spectrum Policy Task Force Report* (Nov. 15, 2002) [“SPTFR”].

¹⁷ FCC July 2004 Order, pars. 11-14.

¹⁸ FCC July 2004 Order, par. 9.

The FCC has recently sought to remedy this situation in ruling on a request to restructure 2.5 GHz band licenses submitted by the Wireless Communications Association.¹⁹ Notably, the Commission seeks to remove a distinct impediment to efficient deployments, the “interleaving” of ITFS and MMDS licenses. The striped spectrum map leads to abundant emission spillovers, increasing the number of bargains that must be struck with adjacent licensees. This, combined with hold-out incentives and uncertainty about how negotiated settlements will impact future regulatory decisions, has slowed the introduction of new technologies to a crawl. Hence, the Commission determines that it will rearrange the 2.5 GHz band, moving high-power (video) and low-power (broadband) licenses into contiguous blocks in an effort to reduce transaction costs. The FCC explains:

By grouping high and low-power spectrum uses into separate portions of the band, this band plan creates opportunities for spectrum based systems or devices to migrate to compatible bands based on marketplace forces, and reduces the likelihood of interference caused by incompatible uses. The new band plan also provides new incentives for the development of low-power cellularized broadband uses of the 2500-2690 MHz band, which have been thwarted by the legacy band structure.²⁰

This remedy, however, does not extend to the particular situation stifling NY3G’s attempt to supply “cellularized broadband uses.” This important effort will remain “thwarted” due to an even more severe spillover problem: co-channel license assignments. With TVC, NY3G is licensed to use four ITFS F channels in the New York City area, but rights are not sufficiently delineated such that an efficient deployment of this airspace has been achieved. In fact, since 1985, negotiations have occurred between the parties, but have failed to move the allocated spectrum to its highest valued use. The current use of the four F channels, covering 24 MHz, is to relay video programs to a handful of receive sites, a transmission service that could be provided by a host of alternatives at a tiny fraction of the opportunity cost of the radio spectrum. Meanwhile, the consumers and businesses of New York City are deprived of highly valued broadband services, including an option offering the advantages of wireless mobility.

The Commission can substantially advance consumer interests by clarifying frequency rights such that consumer demand expeditiously asserts itself. Guidance comes from both economic theory and practical FCC experience. Economists have shown that when rights are assigned directly to those parties that will deploy them, transaction costs can be reduced, speeding investment and usage. This is especially true in situations where bargaining problems block efficient utilization of resources, as observed in the 2.5 GHz band. When rights can be assigned one way or another, it makes economic sense to consider an assignment likely to reduce the cost of transacting.

¹⁹ *A Proposal for Revising the MDS and ITFS Regulatory Regime*, submitted to the Federal Communications Commission by the Wireless Communications Association International, Inc., the National ITFS Association, and the Catholic Television Network, RM-10586 (filed Oct. 7, 2002).

²⁰ FCC July 2004 Order, par. 6.

FCC experience also suggests that assigning broad rights to service providers can result in important transactional efficiencies. This was seen in licensing overlay rights in the PCS band. Incumbent point-to-point microwave users originally opposed reallocation of the 1850-1990 MHz band, arguing that relocation would be extremely hazardous and costly. Yet, the band was very sparingly used and existing operations could easily be transferred to fiber optics or wireless facilities in other bands, while demand for emerging personal communications services was intense. The conflict between new efficiencies and vested operations blocked progress for years.

The situation was resolved when the Commission awarded PCS overlay rights allowing PCS licensees to utilize allocated bandwidth (either 10 MHz or 30 MHz) subject to the protection of microwave incumbents. For a limited period of time, incumbent users were free to abandon the PCS band, and many (in negotiated settlements) did so. After the designated time limit, however, incumbents were required to move their operations, with incumbents compensating their relocation costs.²¹ Spectrum was rapidly moved into a far more valuable deployment.

The Commission's action was crafted to enable transactions to be conducted at low cost: new rights were broadly awarded to operators, who could then engage in efficient negotiations with incumbents. Moreover, important back-stop mechanisms – forced relocation with full compensation – were attached in order to prevent hold-outs from deterring rational economic results. Peter Cramton, Evan Kwerel and John Williams described the PCS policy thusly:

In addition to circumscribing the spectrum rights of incumbents, the Commission took several other actions to reduce negotiation costs. It decided in July 1993 that if incumbents and new entrants could not agree on whether replacement facilities were comparable, the negotiating parties were required to use alternative dispute resolution (ADR) before referring the case to the Commission. Then in November 1994, the Commission decided that independent estimates of the cost to replace an existing facility be used in resolving disputes between incumbents and new service providers in the case of mandatory relocation. In April 1996, the Commission clarified rules for mandatory negotiations, holding that common-law principles be considered when interpreting the obligation to negotiate in good faith, that the parties be required to share pertinent information, and that providing cost estimates for comparable facilities be the burden on the party alleging bad faith. Specific factors by which to judge good faith were also laid out.²²

The Commission has recognized that transaction costs can deter productive relocation, and that negotiations must sometimes be structured so as to overcome a highly

²¹ Public safety users were subject to different relocation rules than other licensees. See Peter Cramton, Evan Kwerel, and John Williams, *Efficient Relocation of Spectrum Incumbents*, 41 JOURNAL OF LAW AND ECONOMICS 647 (Oct. 1998) [“Cramton et al. 1998”], 666.

²² Cramton et al. 1998, 667.

inefficient result. Today, the 2.5 GHz band spectrum in New York City is a prime candidate for a transaction cost-reducing solution of its own.

Section III. Efficient Rights Assignments

The seminal work in the economics of property rights is Ronald H. Coase's "The Problem of Social Cost."²³ The key to efficiency, Coase discovered, was not in having the government determine the optimal level of spillover (or "pollution" or "radio interference"), but in creating well-defined rights such that market participants (i.e., owners) could easily transact. Self-interested exchanges will then determine optimal resource use.

The Coase Theorem served to underscore the centrality of transaction costs in market efficiency. Productive outcomes are blocked when bargaining costs become prohibitive. Transaction difficulties quickly became a concern to economists. Some confusion has surrounded this issue, however, as explained by economist Paul Milgrom:

The "zero transaction cost" assumption on which the Coasian argument is based... is not one that Coase ever advocated as a description of reality. Rather, it was advanced as part of a thought experiment to emphasize the importance of understanding actual transaction costs.²⁴

In an important 1972 paper,²⁵ Harold Demsetz considered how liability rules should be determined. Liability rules are property rights from the reverse angle; instead of an entitlement to benefit from a valuable opportunity, liability rules impose economic loss in the event of harm. Demsetz used the Coase Theorem result that efficiency would ensue from clearly defined rights (liabilities), and then considered the effect of transaction costs, focusing on the problem of legal responsibility for accidents.

Bargains are often difficult to consummate in deciding liability for accidents, damage-causing events that tend to occur between strangers who have no direct connection. This constitutes a transactions cost issue; even if every individual would like to have a certain set of liability rules, agreement is difficult to achieve. Hence, Demsetz offered an efficient solution: policy makers or judges should, when otherwise undecided between alternative assignments, assign liability to "least cost avoiders." Demsetz showed that this distribution of rights would produce an efficient outcome, one that would naturally obtain in the marketplace were rights defined in another way *and* transaction costs non-existent.

Demsetz, following Coase, argued that economic agents should be free to negotiate new rules. His liability assignment was to guide policy in situations where a

²³ Coase, *The Problem of Social Cost*, 3 JOURNAL OF LAW & ECONOMICS 1 (1960).

²⁴ Paul Milgrom, *PUTTING AUCTION THEORY TO WORK* (Cambridge University Press, 2004), 20.

²⁵ Harold Demsetz, *When Does the Rule of Liability Matter?* 1 JOURNAL OF LEGAL STUDIES 13 (1972).

rule could be imposed either way. To tip the scales, awards that reduced transaction costs would logically be favored. This analysis rested on the following contentions:

- a) transaction costs were likely to be important in many real-world situations;
- b) well-defined rights were properly assigned to market participants with the right to reconfigure such rights, allowing markets to adjust to changing circumstances;
- c) the efficient way to award such rights initially was to those parties that would most productively use them, thereby mitigating the costs of trading in the market.

This analysis is applicable to policy decisions facing regulators in the 2.5 GHz band. In particular, the corollary to assigning liability to “least cost avoiders” of accidents is that property rights should be assigned to “most efficient providers” of services. But before applying that analysis directly, I first examine problems in the existing configuration of rights.

Section IV. Common Interest Tragedies

Ronald Coase demonstrated that private markets would distribute property rights to achieve efficient resource use, given easy (low cost) transactions. Further research, some of which has been informed by FCC regulatory experience,²⁶ has underscored the importance of transactions costs. Real world situations are observed where private rights are not quickly assembled in productive ways, squandering valuable opportunities.

Perhaps the classic analysis of this phenomenon is provided in Michael Heller’s famous 1998 article in the *HARVARD LAW REVIEW*.²⁷ Heller, working as a World Bank lawyer in post-Soviet Russia, noticed that gigantic storefronts were vacant on Moscow streets even as retail customers flocked to purchase items at tiny kiosks placed on sidewalks immediately adjacent to the idle buildings. While Heller initially assumed that the large structures had not been privatized, in fact they had. Various rights had been issued to diverse parties in uncoordinated fashion.

An individual might own the second floor, and a labor union the first and third floors, with an agency of the local government owning the right to rent the underlying land to either party.²⁸ Heller’s investigation revealed that with rights so convoluted, compiling ownership into productive packages was difficult and time consuming. Because rational business planning required coordination of all the various parts of the building, distributing the inter-related interests so widely set-up a complex bargaining game that might take years or decades to resolve. Individual parties often enjoyed strong economic incentives to hold-up value-creating enterprises, exercising effective veto

²⁶ See, for example, Thomas W. Hazlett, *Spectrum Tragedies*, *YALE JOURNAL ON REGULATION* (forthcoming, Summer 2005).

²⁷ Michael A. Heller, *The Tragedy of the Anticommons: Property in the Transition from Marx to Markets*, 111 *HARVARD L.R.* (1998) [“Heller 1998”], 621.

²⁸ See, Heller 1998, 638.

power which might be used to extract a sizeable fraction of total gains. Meanwhile, social wealth simply evaporated.

Prof. Heller labeled this dilemma a “tragedy of the anticommons,” a corollary to Garrett Hardin’s well-known “tragedy of the commons.”²⁹ In the latter, open access leads to over-use of the resource, with resulting lack of efficient conservation; in the former, the widespread distribution of effective veto rights led to inefficient under-utilization. In reality, both problems create identical inefficiencies seen from opposing vantage points.³⁰ The problem is that property rights are distributed too widely, making rational coordination difficult.

This is the general description of the specific problem that prevails in the 2.5 GHz band. The Commission distributed a large number of private use rights, and many licensees can effectively ‘veto’ spectrum uses sought by others. This is a by-product of the “command and control” system, that sought to issue licenses for very specific purposes with designated (analog video broadcasting) technologies, combined with the more liberal regulatory approach that, in recent decades, has allowed a broader range of services and transmission systems. With the interspersing of the distinct regulatory rules and licensing formats, licensees seeking to provide the more modern wireless applications must gain permission from interests grandfathered for the older services. Under these conditions, it is often economically rational for licensees to use their rights not to provide service to the public, but as bargaining chips in negotiations. Because they can stop others from creating large new increments of value, they are in a position to extract a large fraction of the new gains. This appears to describe the impasse in negotiations in New York City’s BRS/EBS market.

Economist Paul Milgrom has written:

[E]ven in the simplest case with just a single license for sale, there exists no mechanism that will reliably untangle an initial misallocation. Intuitively, in any two-sided negotiation between a buyer and a seller, the seller has an incentive to exaggerate its value and the buyer has an incentive to pretend its value is lower. These misrepresentations can delay or scuttle a trade.³¹

When regulatory rights are in flux, this situation is exacerbated. Transactions reveal information to regulators about resource value trade-offs. This information can be damaging to the interests of rights holders, particularly when license values are based on opportunities for hold-up rather than the deployment of services. When an incumbent licensee sells out for its relocation costs, and those costs are very modest, it is then compromised in arguing for regulatory concessions elsewhere. Parties then have a strong financial incentive to avoid the transparency that successful market negotiations imply.

²⁹ Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243 (1968).

³⁰ Lee Anne Fennell, *Common Interest Tragedies*, 98 NORTHWESTERN U.L.R. 907 (Spring 2004).

³¹ Milgrom 2004, 20-21.

The FCC focuses on the bargaining problem when it comments:

The current interleaved band plan, coupled with the current adjacent channel interference protection rules, effectively precludes any licensee from providing broadband service unless consent is received from the licensee of the interleaved channel group (e.g., the licensee of the A Group cannot deploy two-way services without consent from the licensee of the B Group, and vice versa). This hampers the ability of individual MDS and ITFS licensees to deploy broadband services by giving adjacent channel licensees veto power over any such offering.³²

The interleaving of licenses, which the FCC seeks to end in its rebanding plan announced in July 2004, is actually a milder form of organizational problem than is observed in the New York City market. While 2.5 GHz band users generally experience problems with *adjacent* channel interference, co-channel licensees share *identical* frequencies in New York. Negotiations have proceeded for several years, despite the “vacant storefronts” represented by the ITFS F Block assignments.³³ Complicating efforts to reach agreement leading to productive spectrum use is the imprecision of current use rights and uncertainty over future rights assignments.

Allowing private parties to obtain rights to use the 2.5 GHz band frequencies in more flexible ways is a step in the right direction, as it makes it possible for new technologies and services to be deployed. But without policies to limit the transactional difficulties in utilizing the expanded rights, few opportunities have been realized:

The Commission has sought for several decades to develop regulatory policies in the 2500-2690 MHz band that would tap this band’s great potential to host a variety of services. As discussed more fully below, however, the regulatory history of the band has been marked by changing and sometimes conflicting policy goals, which have tended to suppress investment, innovation, and responsiveness to changes in wireless technology and demand for services.³⁴

Section V. Policy Solutions

One possible remedy to the transition problem in the 2.5 GHz band has been demonstrated in the PCS band reallocation. While new PCS licensees were given overlay rights to use 1.9 GHz spectrum according to FCC rules, existing point-to-point microwave users enjoyed vested rights. The Commission sought to limit disruption, but also to facilitate transition to higher valued services. The liberal overlay rights awarded to winning PCS license bidders were augmented with a framework for negotiations with incumbents. The rules specified a time period for voluntary negotiations, followed by

³² FCC July 2004 Order, par. 13.

³³ Glenn Bischoff, *FCC Revamps MDS, ITFS Rules*, MOBILE RADIO TECHNOLOGY (June 11, 2004).

³⁴ FCC July 2004 Order, par. 9.

additional time to engage in mandatory negotiations. The FCC then resolved disputes extending past the time limit.³⁵ New overlay rights holders were given liability for the cost of incumbent relocation.

The analogy to the present dilemma over transition in the BRS/EBS band is straightforward. In PCS, the Commission did more than issue new liberal overlay rights, it put into place a mechanism for moving spectrum into deployments most demanded by consumers. This process did not appropriate any group of licensees, but helped ensure that delays would not swamp the social benefits of transition. As Peter Cramton, Evan Kwerel and John Williams have described it:

Often, it is necessary for the new license holder to relocate incumbents to make efficient use of the spectrum. Regulations structuring the negotiation between incumbent and new entrant can promote efficiency... An indefinite right to stay gives incumbents too much power in negotiating large premiums for relocating or terminating. Holdout problems can lead to large bargaining costs. These costs can be reduced by giving entrants the right to move the incumbent. This rule works especially well when the cost of relocating the incumbent can be objectively estimated and entrants are required to compensate incumbents for clearing the spectrum.³⁶

Having the opportunity to clarify the distribution of rights in a way that promotes efficiency,³⁷ regulators should be cognizant of the economic trade-offs involved. In the New York City market, use of the 2.5 GHz band has been stalled for two decades while negotiations to rationalize license assignments have proceeded. Transactions costs are evidently a substantial problem. The Commission concluded in its recent Report & Order that it should move to remedy the transactional impediments preventing efficient deployments elsewhere in the band. Those specific remedies do not directly translate into a solution for the F channels in the New York City market, but the basic logic does.

First, the Commission should better define NYC 2.5 GHz band use rights. The co-channel sharing arrangement has created ambiguity, undercutting negotiations and, therefore, service deployments. The Commission has noted:

[A]ll spectrum users require clear rules governing their interactions with the Commission and other spectrum users. Regardless of how or to whom particular rights are assigned, ensuring that all rights are clearly delineated is important to avoiding disputes, and provides a clear common framework from which spectrum users can negotiate alternative arrangements.³⁸

³⁵ See Cramton et al. 1998, 667, and Congressional Budget Office, *Where do We Go From Here? The FCC Auctions and the Future of Radio Spectrum Management* (April 1997), 78.

³⁶ Cramton et al. 1998, 647, 673.

³⁷ NY3G argues, in documents submitted to the FCC, that appropriate enforcement of Commission rules would result in TVC moving its video broadcast operations to its B channels and returning its F channel licenses. This would thus resolve the co-channel interference problem.

³⁸ SPTFR, 18.

Second, the Commission should seek to assign these clear rights to the parties that will make most beneficial use of them. This clearly favors the MDS licensee, with a license to provide wireless broadband in a relatively flexible regulatory framework. ITFS licensees, in contrast, are limited to a much narrower range of services, services which can be (in the case of the F channels) provided via competing platforms at modest cost. Just as the FCC has generally remapped the 2.5 GHz band to enable MDS licensees to deliver low-power broadband links with reduced transaction costs, assigning “a right to move”³⁹ to NY3G would lower the costs of creating the presumptively efficient resource allocation.

Third, a compromise assignment rule would award a right to move, but would assess NY3G with liability to compensate for relocation costs.⁴⁰ If this approach is selected, it is vital that a mechanism be included to mitigate the hold-up problem, limiting NY3G’s liability to actual (and efficient) relocation costs while achieving resolution (and band clearing) expeditiously. Two decades of failed negotiations have amply demonstrated that unstructured bargaining can delay consumer gains indefinitely. This is exactly the problem that Commission policy should be designed to remedy.

Section VI. Consumer Benefits from Efficient Rights Assignments

In this section I examine the costs and benefits associated with an assignment of license rights that succeeds in quickly producing optimal resource utilization in the four ITFS F channels in New York City.

The Current Use Value of ITFS “F” Channels.

The ITFS F Channel licensee, the Diocese of Brooklyn, transmits educational content specifically to a limited number of receive sites in the New York City area. This content, also broadcast on the licensee’s B channels, is delivered to additional locations. These relays could be duplicated by a variety of options. Moreover, the expense incurred by these substitutes constitutes a small fraction of the opportunity cost of the 24 MHz allocated to the four channels. It is clear that, were transactions costs zero, the spectrum would be reallocated from video relay service to wireless broadband, as concluded in a more general context in the FCC’s July 2004 Order.

Consumer Surplus Gains from Redeployment 2.5 GHz Bandwidth

With interfering uses removed as impediments, advanced wireless services highly demanded by consumers could be provided. Two options are possible. First, 2.5 GHz frequencies could be used to expand the scope and functionality of existing CMRS

³⁹ Cramton et al. (1998, 673) discuss two basic policy choices. Assigning a “right to move” to the licensee providing new services allows that party to relocate incumbents. In contrast, a “right to stay” allows the incumbent to determine when to move.

⁴⁰ Cramton et al. favor this approach, called “right-to-move-with-compensation.” *Ibid.*

(cellular and PCS) networks. Second, this bandwidth could be deployed in advanced fixed or mobile wireless broadband applications, so-called 4G networks. I calculate consumer gains that are likely to be realized from the latter, in that this is the path that NY3G has announced it intends to travel. Assuming that NY3G could constitute the 3rd, 4th, or 5th broadband platform in the New York City area allows us to see how competitive entry might lower prices and enhance consumer surplus. This method should substantially understate the gains from wireless broadband competition, in that it ignores the advantages provided by data service mobility as well as the increased rivalry brought to the mobile voice market.

Table 2. Broadband Price Changes with Competitive Entry in Cournot Equilibrium Assuming Elasticity of Demand = -1.25				
Number of Firms	\$ MC	Price / MC Ratio	Equilibrium \$ Price/mo.	% Price Drop with Entry
2	23.89	1.67	39.82	--
3	23.89	1.36	32.58	18.2%
4	23.89	1.25	29.87	8.3%
5	23.89	1.19	28.44	4.8%

Notes & Sources: Price drop calculated using Lerner Index, $(P-MC)/P = 1/(ne)$, where n is the number of competitors, and e is the elasticity of demand for the market as a whole. Current (year-end 2003) mean U.S. broadband price taken from, Credit Suisse First Boston, *The Broadband Battle, 2003: A Crossroads for High-Speed Data* (April 2003), Exhibit 4. This monthly price equals average revenue per subscriber across DSL and cable modem subscribers nationwide. Current marginal cost for broadband service, which is assumed to be constant, is calculated using the Lerner Index assuming current price = \$39.82 per month and $e = -1.25$.

To do so, it is convenient to reference an economic model the FCC has relied upon.⁴¹ Marginal costs (MC) are assumed constant and competition among a few suppliers follows a Cournot process. I assume that elasticity of demand (for the residential broadband market) over the relevant interval is equal to -1.25.⁴² With current prices (as of year-end 2003) averaging about \$39.82 per month for broadband service,⁴³ the Cournot and constant MC assumptions imply $MC = \$23.89$.⁴⁴

As shown in Table 2, a Cournot equilibrium predicts price changes associated with the enhanced competition offered by a new entrant. Here, broadband prices drop

⁴¹ Evan Kwerel and John Williams, *Changing Channels: Voluntary Reallocation of UHF Television Spectrum*, Federal Communications Commission: OPP Working Paper 27 (Nov. 1992), 82.

⁴² Robert Crandall et al. assume broadband demand elasticities from -1.0 to -1.5. I use the midpoint. Robert Crandall, Charles Jackson, and Hal Singer, *The Effects of Ubiquitous Broadband Adoption on Investment, Jobs, and the U.S. Economy*, Criterion Economics (Sept. 2003).

⁴³ Credit Suisse First Boston, *The Broadband Battle, 2003: A Crossroads for High-Speed Data* (Apr. 2003), Exhibit 4

⁴⁴ This is done by way of the Lerner Index: $P-MC)/P = 1/(ne)$, where n is the number of competitors, and e is the elasticity of demand for the market as a whole. This calculation also assumes each competitor has an equal share of the market.

between 4.8% and 18.2%, depending on whether the 2.5 GHz spectrum is used for the 5th or the 3rd broadband platform. A 4.8% price reduction results in consumer gains of \$35 million in 2005. See Table 3. This projection employs the assumption that there are 40 million broadband subscribers nationwide in 2005,⁴⁵ and that five percent of these subscribers are in the New York City area.⁴⁶ An 18.2% price reduction generates consumer gains, using symmetric assumptions, of \$194 million per annum. It should also be noted that between 119,000 and 455,000 new subscribers take broadband due to these price reductions, expanding the development of high-speed networks. Again, these are likely to be conservative estimates, in that the advantages gained from mobility (potentially important in both voice and data services) are excluded from the analysis.

TABLE 3. BROADBAND ENTRY VIA 2.5 GHZ SPECTRUM:
ANNUAL CONSUMER SURPLUS GAINS FROM 3RD OR 5TH RIVAL

	<i>Pre-entry</i>	<i>Post-entry</i>	<i>Explanation</i>
NYC Broadband Subscribers	2 million	2.119 million to 2.455 million	Assumes 40 million nationwide broadband subs in 2005, with 5% in NYC. Assumes elasticity of res. broadband demand = -1.25.
Broadband \$ Monthly Rate	39.82	28.44 to 32.58	Price drop of 18.2% for 3 rd entrant; 4.8% for 5 th entrant. See Table 2.
Annual Consumers' Surplus Gain	n.a.	\$35 million to \$194 million	2 million broadband subs save \$1.42 to \$7.24 per month, plus 119,000 to 455,000 new subs enjoy broadband service.

The Cost-Benefit Trade-offs.

New York's ITFS F channels could be utilized to provide social benefits far in excess of those currently delivered. A rule which imposed liability on the broadband rights holders for the expense of providing alternative transmissions would ensure that such costs were entirely offset by the *producers'* gains in moving this spectrum into broadband services. Under these circumstances, a supplier would utilize the bandwidth to provide broadband only on the expectation that newly-realized profits would be sufficient to compensate. This implies that the producer surplus gains would be positive *net* of the costs of accommodating incumbent spectrum users.⁴⁷ Hence, the consumer

⁴⁵ As of the third quarter of 2004, there were about 33 million U.S. residential broadband subscribers, with growth of about 2 million per quarter. Leichtman Research Group, *Research Notes 4Q 2004* (Dec. 2004).

⁴⁶ As of April 2000, the population of the NY-NJ-PA MSA was approximately 18 million, or 6.5% of nationwide population. We assume the population covered by the licenses to be approximately 5% of the country and that broadband subscribers are uniformly distributed throughout the population.

⁴⁷ I note that NY3G has proposed that MMDS licensees be assessed liability for actual relocation costs. See Comments of NY3G Partnership submitted to the Federal Communications Commission WT Docket No. 03-66, RM-10586 (Jan. 10, 2005), 7-8.

surplus gains available from using the 2.5 GHz band for broadband service to the public would be augmented by additional supply-side efficiency gains.

Insofar as FCC policy is concerned, another important objective is achieved beyond the advancement of consumer welfare. The Commission considers the advancement of high-speed networks a top priority. By eliminating obstacles blocking the entry of broadband networks, and facilitating investments which will produce new competitive platforms, it will unleash market forces which will lower prices and expand service. Depending upon the elasticity of demand and the emergence of still other competitive rivals, between 119,000 and 455,000 new residential broadband subscribers in the New York area could be brought into the high-speed market. This would achieve much of what the Commission pledges as its mission in the regulation of the 2.5 GHz band:

(1) promoting availability of broadband to all Americans, including broadband technologies for educators; (2) encouraging increased competition in wireless broadband through the creation of new opportunities for new entrants, (3) promotion of the economic viability of services in this band by ensuring that the spectrum is as fungible, tradable, and marketable as possible, (4) facilitating the highest use of radio licenses, (5) facilitating speed of transition and deployment in the band, (6) providing incumbents with a reasonable opportunity to continue their current uses of the spectrum, and (7) the continued promotion of spectrum-based education services.⁴⁸

By defining rights such that markets can offer the services most highly valued by customers, regulators can support each of these goals. It bears noting that the increase in opportunities for broadband will benefit, in substantial measure, educators and students, while rules protect current uses (if by more efficient transmission mechanisms). Hence, efficient rule changes can extend existing educational opportunities while expanding the range of new options for educational and other consumers of high-speed data networks.

Section VII. Conclusion

Federal policies in the 2.5 GHz band have produced a classic problem in economic organization, often known as tragedy of the anticommons. When use rights are distributed in ways that are difficult to reassemble, and the production of valuable goods or services is linked to aggregation of rights, large inefficiencies can result. Specifically, licenses have been apportioned in the 2.5 GHz band such that individual rights holders have been able to block other rights holders from productive employments. While negotiations have long been attempted, they have largely failed to restructure the allocated frequencies despite intense consumer demand for the broadband services that this spectrum could economically deliver.

⁴⁸ FCC July 2004 Order, par. 5.

In the general case of MMDS/ITFS channel interleaving, the Commission has recently moved to eliminate many of the emission spillovers by imposing a new structure on the 2.5 GHz band. This is expected to lessen the need for agreements, reducing transaction costs and paving the way for productive use of radio spectrum. Yet, in the specific case of New York City, the country's largest market, the spillover effect is even more severe due to co-channel sharing, and yet no remedy has been adopted. The bargaining impasse, already two decades long, is hugely expensive to society.

Proper clarification of use rights in the band can resolve this situation. This determination will encompass a decision as to which party is liable for relocation costs. Imposing such costs on the incumbent would serve to minimize transaction costs, as no transactions would be required for the incumbent to internally determine the least cost manner in which to shift its F channel relay service to alternatives.

Alternatively, the MMDS licensee could be made liable for relocation costs. In this case, it is imperative that the FCC include a mechanism to expeditiously determine actual relocation costs, which are relatively small, and thereby avoid much larger bargaining costs, which include delays that block the deployment of advanced wireless technologies. In the PCS block, new overlay licensees were given liability for incumbent relocation costs, but the Commission spurred agreements through a variety of devices, including requirements for good faith bargaining, time limits, and third party dispute resolution. The consumer value available through the productive use of the 2.5 GHz F channels in New York City is conservatively estimated to be between \$35 million and \$194 million annually. Given the long history of unsuccessful negotiations and idle spectrum, rules should rapidly be adopted that allow these gains to be expeditiously realized by the public.